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‘Development in Reverse’? A Longitudinal Analysis of Armed Conflict, Fragility and School Enrolment

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Abstract

This paper presents a longitudinal analysis of cross-national data on armed conflict, state fragility, and enrolment in primary and secondary schooling. The study is motivated by questions raised in the 2012 *Human Security Report*, which challenges the widely-held assumption that conflict is necessarily detrimental to educational outcomes. We use multi-level modelling techniques to determine how conflict and fragility relate to changes in enrolment. Our findings suggest that growth in enrolment is significantly lower in conflict-affected countries but that the effect is dependent upon countries’ overall enrolment level. However, when we control for fragility, the effect of conflict is not significant, which is consistent with the *Human Security Report*’s suggestion that fragility is an underlying cause of both conflict and poor educational outcomes. We conclude by discussing the relevance of our findings and challenges for future research on fragility and education.

Keywords: International Education; Development; Conflict; Fragility; Educational Policy; Enrolment

Introduction

Recent years have seen considerable growth in research on the complex relationships between education and violent conflict (e.g. Bush and Saltarelli 2000; Smith and Vaux 2003; Davies 2004). Research demonstrates instances where education shows ‘positive’ faces, preventing or mitigating conflict and/or supporting post-conflict recovery, or ‘negative’ faces acting as a contributory factor towards conflict (Bush and Saltarelli 2000). Further investigation demonstrates the complexity of the interaction between education and conflict, highlighting instances where ‘positive’ and ‘negative’ faces of education are visible simultaneously (e.g. Barakat 2008; Lopes Cardozo 2008; Paulson 2008; Shields and Rappleye 2008). However, much research - along with the practice of education in emergencies that draws upon it – assumes a unidirectional and negative effect of conflict on education. This is supported by evidence of attacks on schools (O’Malley 2010), displacement of populations (Ferris and Winthrop 2010) and loss of human capital (Buckland 2005) among other negative consequences of conflict on the delivery and quality of education.

UNESCO’s 2011 *Education for All Global Monitoring Report*, which takes armed conflict and education as its theme, likewise assumes the effect of conflict on education to be negative. The report outlines a ‘hidden crisis’, claiming that ‘conflict is destroying

opportunities for education on a global scale’ and that it is a major barrier to achieving the Education For All (EFA) goals. As evidence of this claim, UNESCO (2011, 31) points out that ‘conflict-affected countries are heavily concentrated at the wrong end of the global scale measuring education performance’ and that ‘the poorest among them account for a disproportionately large share of the world’s out-of-school children.’ Its overall approach embeds a liberal understanding of conflict and development (Suhrke and Chaudhary 2009), constructing an antithetical relationship between the two as epitomised in Collier and colleagues’ (2003, 13) often-quoted claim that conflict is ‘development in reverse.’

The 2012 *Human Security Report*, on the other hand, raises questions about what it calls ‘the mainstream narrative’ on conflict and education that the UNESCO report exemplifies. The authors of the *Human Security Report* argue that research on education and conflict relies upon a number of assumptions that have only been established through case study research, which suffers from worst-case bias (2012, 81). The assumption that conflict is necessarily damaging to education, therefore, is established upon the generalization of the experience of a few well-researched and arguably extreme cases. These cases are then employed to understand instances of violent conflict and its effects on education generally. In contrast, the *Human Security Report* argues that education is ‘a development indicator that again appears to *improve* during many periods of warfare’ (ibid., 79, original emphasis).

This paper takes the questions raised in the *Human Security Report* as a starting point through which to evaluate the assumption of much writing on conflict and education that conflict is necessarily damaging to educational outcomes. We do this through a longitudinal analysis of the relationship between conflict, state fragility and school enrolment. We begin by presenting previous research and theoretical perspectives related to the relationships between conflict and educational outcomes. We then introduce our data and methods and present results of the analysis, which show a statistically significant relationship between conflict and changes in enrolment rates and which introduce new findings about the relationship between fragility and enrolment rates. We conclude by discussing the implications of these findings for research on conflict and education and possibilities for future research.

Related Literature

Previous research has characterised the relationship between conflict and education as complex and multi-directional. Empirically, this topic is often examined through country-level analyses, qualitative studies of conflict-affected contexts, and research into the effects of conflict on schools themselves (e.g. Bush and Saltarelli 2000; Obura 2003; Nicolai 2004, 2007; Sommers 2005; Lopes Cardozo 2009). In contrast, recent quantitative studies offer the ability to examine the relationship across multiple contexts. For instance, a 2010 UNESCO Institute for Statistics (UIS) study that used data from nationwide population surveys between 1950 and 2010 found that in 23 of 25 conflict-affected countries some negative effects of conflict on education could be observed. However, there was considerable variation between countries and the negative effect was not always visible on both outcome variables (share of population without formal schooling and average years in formal schooling). The negative legacy of conflict that the UIS study observed in all but two cases was often more apparent at

the regional (rather than national) level or on the attainment and/or participation of particular groups of students: girls or boys, rich or poor students, rural or urban populations depending on the context.

Another 2010 study conducted by FHI 360's Education Policy Data Center (EPDC) analyses school enrolment and attendance in 19 countries that experienced conflict between 2000 and 2010. This analysis investigates the effect of conflict on enrolment and attendance at the regional level, exploring trends in regions affected and not affected by conflict. The *Human Security Report* (2012, 94) reports that 'the most surprising finding to emerge' was the fact that in many of the countries examined, the regions worst affected by conflict experienced rising levels of school attendance during conflict periods. However, the study itself found it difficult to draw conclusions across the sample; the range of differences between countries and regions was very broad and it was not possible to establish whether differences in attendance across regions were caused by conflict. The study does conclude that on average attendance rates were lower in regions affected by conflict than in peaceful ones (EPDC 2010). Of note was the finding that lower overall attendance rates across the country as whole corresponded to greater differences between attendance in conflict and non-conflict areas, suggesting that the effect of conflict varies with the overall level of enrolment.

Both the UIS (2010) and EPCD (2010) studies provide evidence of a negative relationship between conflict and education. Furthermore, their use of survey and regional data, respectively, offers greater insight into differences across gender, socioeconomic groups, ethnicity and rural/urban location than national data can provide. However, their analyses rely primarily on comparison of aggregate data and visual inspection of trends. In contrast, regression analysis offers the ability to test specific hypotheses about the relationship between conflict and education as manifested in national data. A study undertaken by researchers at the Peace Research Institute Oslo (Gates et al. 2010, 2012) analyses the relationship between conflict and progress towards the Millennium Development Goals (MDGs) in developing countries. As part of the study, the authors use fixed-effects modelling to perform a cross-sectional analysis of the relationship between conflict (measured in battle-related deaths) and indicators related to the MDGs, including primary and secondary enrolment. While many indicators are negatively related to conflict, the effect of conflict on enrolment rates was not significant.

In contrast, the work of Lai and Thyne (2007), which also uses regression analysis, finds the relationship between conflict and education to be negative and statistically significant. Their work examined the relationship between intra-state war (measured with two different datasets) and indicators for enrolment and expenditure at primary, secondary and tertiary levels. In their analysis, the relationship between conflict and educational outcomes is significant in all cases. Furthermore, they show that expenditure on education continues to decrease in post-conflict contexts, suggesting that the effects of conflict on education extend beyond the duration of the conflict. For an average conflict-affected country, the effect of conflict would result in a loss of 64,000 students (Lai and Thyne 2007).

To support its critique of the ‘mainstream narrative,’ the *Human Security Report* draws upon this research, reviewing the work of UIS (2010), the EPDC (2010), and Gates et al. (2010, 2012) in depth. As the *Human Security Report* shows, these studies do present challenges to the assumption that conflict is necessarily damaging to education. However, they also provide evidence of a negative relationship between conflict and educational outcomes. The findings from recent quantitative research are, in fact, more nuanced than either the *Human Security Report*’s meta-analysis or the *Global Monitoring Report*’s ‘mainstream narrative’ acknowledge. In particular, the *Human Security Report* conflates evidence that education ‘appears to *improve* during many periods of warfare’ (e.g. enrolment rates increase over time even during conflict) with the notion that conflict has little or no effect on education. In fact, the authors of the quantitative studies reviewed note that conflict often decreases the rate at which educational indicators grow, an effect that should not be ignored. Nevertheless, the *Human Security Report* is useful in pointing out the limitations of existing studies, particularly the limits of selective country sampling (e.g. EPDC 2010; UIS 2010) and the discrepancy in the results of previous regression analyses (Gates et al. 2010, 2012; Lai and Thyne 2007). Furthermore, the *Human Security Report* encourages work to understand the root causes of low educational outcomes, suggesting state fragility as ‘an obvious candidate’ (Human Security Report 2012, 109).

Our study seeks to contribute to the quantitative evidence on the relationship between conflict and educational outcomes (in this case, net enrolment at primary and secondary level) using multilevel longitudinal analysis. Additionally, we take up the *Human Security Report*’s suggestion that state fragility be considered in the analysis. Specifically we test the relationship between fragility and rates of enrolment to explore whether fragility may have a stronger effect than conflict. State fragility is notoriously difficult to define, as we discuss in more detail below. By including it, however, we open the analysis to the possibility that conditions (e.g. those often used to define fragility, such as poor governance, weak capacity, failure to deliver services) pre-dating or other than the outbreak of violent conflict be related to changes in enrolment.

We use data from 2000 to 2012. We chose this period for two reasons. Firstly, it coincides with start of the Dakar Framework for Action, which set a 2015 goal for universal primary enrolment and initiated a programme of regular monitoring and reporting for the EFA programme. Dakar in 2000 also saw the founding of the Inter-Agency Network for Education in Emergencies, which led to growing attention for education in emergencies as a field of practice and research (Burde et al. forthcoming). One consequence of the Dakar Framework is that reporting and monitoring of data improved substantially, thus data availability post-2000 is much better than in preceding years, our second reason for choosing this period. 2012 is the most recent year for which NER data are available at the time of writing.

It is important to note that this period is part of a larger historical context that has witnessed decreasing levels of ‘conventional’ armed conflict (World Bank 2011). Since the end of World War II, interstate war has declined dramatically. Intrastate (or civil) war increased during the postcolonial and Cold War period, reaching a peak in the late 1980s and early 1990s. Since then, intrastate wars have also decreased in number and intensity: for example,

in 1991-2 there were 21 active major civil wars, but there have been less than ten each year since 2002¹ (ibid.). Similarly, the number of annual battle deaths in civil wars decreased from an average of 164,000 per year in the 1980s to 42,000 per year in the 2000s (ibid.). This is a period, therefore, with a lower frequency and intensity of conflict than that of 1990s when the assumption, widely held within education in emergencies research and practice, that conflict is necessarily damaging to education took hold.

Methods and Data

Our analysis uses multilevel modelling techniques for longitudinal data (Singer and Willet 2003) to systematically examine the relationship between conflict, fragility, and changes in school enrolment. This approach combines insight into individual change trajectories – the changes in enrolment of individual countries over time – and the relationship between enrolment, conflict and fragility across countries. While it would be possible to perform a cross-sectional analysis – looking at how enrolment differs between conflict-affected and non-conflict countries for all yearly observations in the data – our focus on how growth trajectories are related to conflict requires a longitudinal approach.

Data Sources and Variables

Our educational outcome data are enrolments in primary and secondary schooling between the years 2000 and 2012, giving a total timespan of 13 years. Enrolment is measured using primary and secondary net enrolment rates (NER) published in the World Bank's World Development Indicators (2013), which reports data from the UNESCO Institute for Statistics. Net enrolment rates measure the number of children enrolled in a given level of schooling (i.e. primary or secondary) as a percentage of the eligible age group. NER differs from Gross Enrolment Ratio – the other predominant measure of enrolment – in that it includes only those children in the official age group for the relevant level of schooling; thus, overage students are not counted and the maximum possible NER is one hundred per cent (UIS 2009). Net enrolment rate is also defined as the official indicator for the second MDG, which aims to 'achieve universal primary enrolment' by 2015 (United Nations 2000).

Our study differs from others in that it includes any country for which sufficient data are available and does not purposively select countries for analysis nor limit selection to developing countries, which limits any bias created by purposive selection. Specifically, our analysis of primary enrolments includes any country with at least 5 data points reported between 2000 and 2012. Because data on secondary enrolment are less readily collected and reported, we required only 4 data points for countries included in the analysis of secondary NER. The complete dataset includes 159 countries with a total of 1,640 enrolment values for primary NER and 127 countries with 1,197 secondary NER enrolment values. Thus, although we require only 4 or 5 data points, the actual number of enrolment data points per country is much higher (10.31 and 9.45 for primary and secondary NER, respectively).

¹ Data are available up to 2008 (see World Bank 2011).

Measuring conflict and fragility is somewhat more challenging than enrolment: both concepts, and their measurement, are vehemently contested and often ambiguous. Furthermore, many datasets on armed conflict do not capture conflict caused by organised crime, drug-based violence or structural violence, all of which may have effects on education. Understanding education in relation to changing patterns of violence – alongside more established research on ‘conventional’ conflict – is a promising area for future research. Databases compiled by specialist research centres have kept accurate records of inter- and intrastate conflict over a considerable period and allow consistency in definition and measurement across time and country contexts as well as comparability with other studies.

Conflict data are taken from the Uppsala Conflict Data Programme’s Battle-Related Deaths dataset (2012), which reports the number of deaths each year in conflicts around the world. The dataset defines conflict as a ‘contested incompatibility’ that involves armed violence between two organized parties (at least one of which is a sovereign government) and relates to issues of government or territory (Uppsala Conflict Data Programme 2012, 5). In identifying conflict-affected countries, we follow the method used in the 2011 *Global Monitoring Report*, considering a country as conflict-affected if it has experienced 1,000 battle-related deaths (BRDs) or 200 BRDs in any of the past four years (Strand and Dahl 2010). Any country that meets these criteria is considered a conflict-affected country throughout the whole of our 13 year period. In addition to treating conflict as a dichotomous variable, we use the average number of annual battle-related deaths, logarithmically scaled, as a continuous measurement of conflict. This makes it possible to assess whether higher levels of conflict are associated with larger changes in enrolment.

Figure 1 shows the trajectories in net enrolment rates categorized by the dichotomous conflict variable. Clearly, more countries fall into the non-conflict group, which is what one would expect. In both conflict-affected and non-conflict countries, there is a general tendency for enrolment rates to increase over time, which reflects a global context that has witnessed continued long-term expansion in enrolment (Boli, Ramirez and Meyer 1985). Furthermore, more non-conflict countries have consistently high levels of enrolment, particularly for primary schooling. However, it is hard to discern an obvious difference in enrolment trajectories between the two groups. Statistical modelling provides greater insight into these differences than visual inspection of trajectory plots.

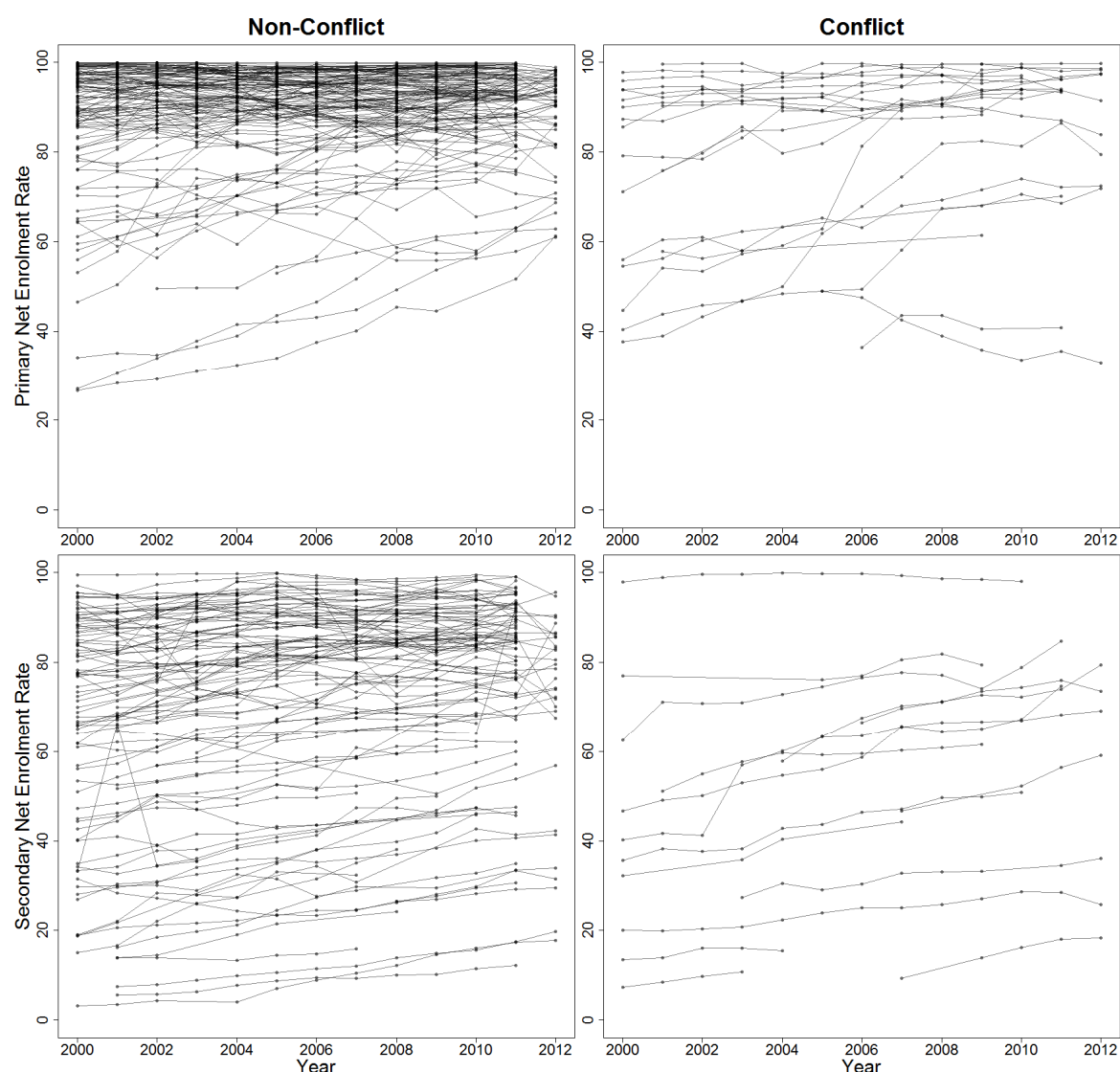


Figure 1: Empirical growth plots of primary and secondary net enrolment rates (NER) by conflict. Each country in the dataset is represented as a line, with lines overlaid to provide an overview of general trends in enrolment for each group. There are clearly more countries in the non-conflict category, and non-conflict countries tend to have more countries with sustained enrolment near the maximum value of one hundred per cent. It is also apparent that countries with lower starting enrolments tend to have higher rates of growth. However, it is difficult to discern clear differences in growth rates based on visual inspection.

We measure fragility using the State Fragility Index (SFI) reported by the Centre for Systemic Peace (2012). The SFI is a composite indicator that combines approximately 20 economic, security, political and social variables to produce a measure of fragility – the state’s ‘capacity to manage conflict...implement policy and deliver essential services’ (Marshall and Cole 2011, 36) – ranging from zero (low) to twenty four (high). As literature regarding fragility and fragile states highlights ‘there are considerable areas of overlap in the use of the term ‘fragile states’ within the development community, but also differences of breadth and emphasis’ (Stewart and Brown 2009, 2). Cammack and colleagues (2006) show how fragility is variously defined in terms of the functionality of states (lacking capacity and/or political will), the outcomes of fragility (including poverty, conflict and global

security threats) and the relationships between fragile states and donors. A number of donors and development agencies compile and maintain lists of fragile states; however, the criteria for classification vary considerably, and the number of states classified as fragile ranges from the Commission on Weak States and US National Security's list of 50 countries to the World Bank's 26 countries (Francois and Sud 2006).

The SFI allows for a more flexible view of fragility by providing a score across its range of variables. We use fragility data are used in two ways: first, the time-averaged composite value is converted to a dichotomous variable, with values higher than the median classified as 'high fragility' with a value of one, and those below the median as 'low fragility' with a value of zero. Second, the full range of the index (0 – 24) is used as a continuous variable, to determine whether higher levels of fragility are associated with larger changes in enrolment. It is important to note that there is a good deal of independent variation between conflict and fragility in the 2000 to 2012 period: there are fragile countries that did not experience conflict (e.g. Zimbabwe and North Korea) and conflict-affected countries that are not fragile (e.g. Russia and Israel).

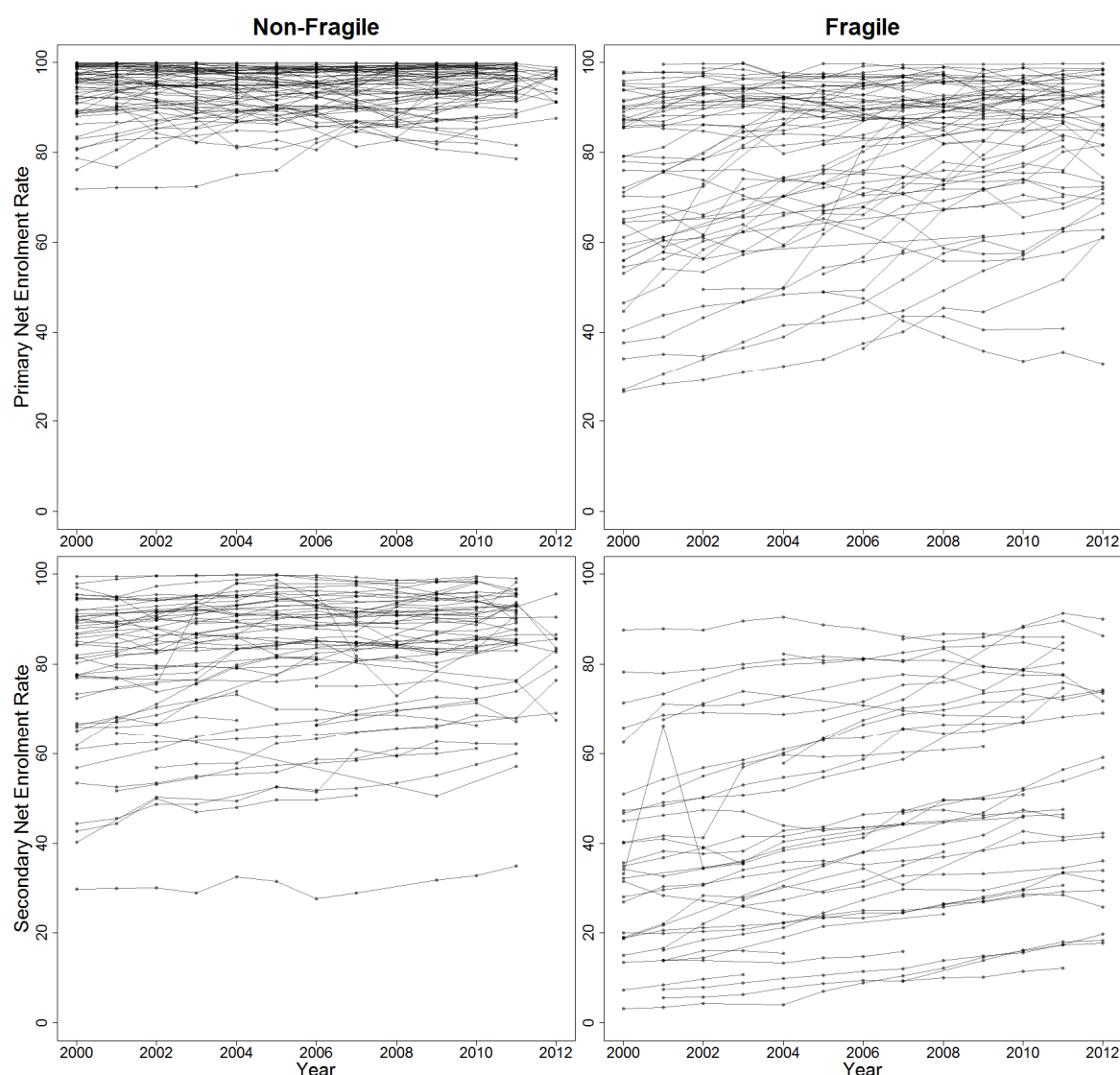


Figure 2: Empirical growth plots of primary and secondary NER by fragility. Each country in the dataset is represented as a line, and lines are overlaid to provide an overview of general trends in enrolment for each group. Plots show a clear difference in enrolment trajectories, particularly for primary NER. Fragile countries appear to have consistently lower baseline enrolment rates than non-fragile countries, although differences in growth rates are difficult to visually assess.

Empirical growth plots of enrolment rates, separated by the dichotomous fragility variable are presented in Figure 2. Unlike Figure 1, the number of countries in each group is even because the dichotomous fragility variable is defined using the median of the SFI (meaning half fall above the value, and half below). Figure 2 also differs from Figure 1 in that differences in the plots are more readily apparent: baseline enrolment rates for non-fragile countries are clearly higher than for fragile countries, particularly for primary schooling.

Modelling Techniques

Multilevel modelling (sometimes called mixed-effects modelling) is particularly well suited for testing hypotheses about data that has a clustered, nested or grouped structure; an example of such data would be test scores for a test that was taken by students in several classrooms. In this case, we might be interested in relationships between variables relating to individual

students (e.g. age, gender, etc.) and test scores, as well as relationships between test scores and characteristics of the whole class (e.g. class size, location, etc.). A powerful feature of multilevel modelling is the ability to simultaneously examine relationships between group-level and individual-level variables. In a longitudinal design, the grouped data are measurements repeated over time (e.g. annual measures of net enrolment) and the ‘group’ is the unit which is repeatedly measured (e.g. a nation-state). Thus, in our study we seek to explain both the changes in enrolment within individual countries and the relationship between country-level variables (i.e. conflict and fragility) and changes in enrolment.

In our analysis, each country’s enrolment is modelled as a linear trajectory that starts at its baseline value (i.e. the enrolment rate for the year 2000) and changes at constant yearly rate. Thus, a country’s primary enrolment for any year (Y_{it}) can be modelled as a function of the 2000 baseline value for the country (β_{0i}) and the annual growth rate (β_{1i} – which can be positive or negative) times the number of years that have elapsed since 2000 ($Year_t$).

$$\text{Level 1:} \quad Y_{it} = \beta_{0i} + \beta_{1i} \text{Year}_t + \varepsilon_{it}$$

$$\text{Level 2:} \quad \beta_{0i} = \gamma_{01} + \gamma_{02}\text{Conflict}_i + \gamma_{03}\text{Fragility}_i + \dots + \zeta_{0i}$$

$$\beta_{1i} = \gamma_{11} + \gamma_{12}\text{Conflict}_i + \gamma_{13}\text{Fragility}_i + \dots + \zeta_{1i}$$

Equation 1: The multilevel model of conflict, fragility, and net enrolment rates. The subscript i is used to denote variables particular to an individual country, and t is used to represent variables specific to a certain time. Thus, Y_{it} – the primary dependent variable – is the enrolment rate for a particular country at a specific point in time (e.g. primary net enrolment for Senegal in the year 2003). The Greek letters β , ε , γ and ζ represent parameters that are estimated based on the data. Restricted maximum likelihood (REML) is used to estimate Level 1 and Level 2 parameters simultaneously, such that the results explain both the change trajectories of individual countries and the relationship between variables across countries. Ellipses in the Level 2 equations indicate that other country-level predictors could be added to the model with little modification required.

The residual (ε_{ij}) signifies that the actual enrolment rate at any point in time will not match that predicted by a linear trajectory exactly; there is inevitably some difference between the enrolment approximated by the linear trajectory and the actual value for a given year. However, preliminary examination of time-series plots for all countries in the dataset suggested that the linear model was able to capture the overall trajectory of changes in enrolment.

The second level models the baseline and change values as outcomes of the conflict and fragility variables across all countries. Thus, for any given country (i) the baseline (β_{0i}) and growth (β_{1i}) can be considered a function of the country’s conflict and fragility. The effects of conflict and fragility on the baseline and change are captured in their respective coefficients (γ_{02} , γ_{03} , γ_{12} , γ_{13}), with the intercepts (γ_{01} , γ_{11}) denoting the average baseline and slope for a non-conflict, non-fragile country. Again, the actual baseline (β_{0i}) and growth (β_{1i}) values for a given country differ from those predicted by the model; this error is captured in the country-level residuals (ζ_{0i} and ζ_{1i}).

The multi-level approach to longitudinal analysis is particularly useful in studying enrolment growth across the entire analysis timeframe. By modelling the changes in enrolment as a country-specific growth rate (β_{1i}), our approach is well suited to deal with missing data and fluctuations in enrolment. Furthermore, multilevel modelling is able to separate cross-country effects (γ), country-specific variation (β and ζ), and variation in yearly observations (ϵ), avoiding the need to use corrective measures for repeated observations (e.g. robust standard errors). However, analysis of the long-term trajectory in enrolment comes at the expense of capturing short-term variations in enrolment rates that coincide with the onset of conflict, which is possible in approaches that analyse year-to-year changes in enrolment (i.e. Lai and Thyne 2007; Gates et al. 2012). For instance, our approach does not allow us to test hypotheses relating to differences in pre-conflict, conflict, and post-conflict growth rates. This trade-off is a deliberate choice that is based on the complex nature of conflict. While one might expect a conflict to result in a drop in enrolment in the same year, it is also possible that the effects on enrolment could lag by several years, or even precede the conflict (for example, in the case of a gradual social deterioration leading to conflict). This is supported by Lai and Thyne's (2007) findings that negative trends in enrolment continued in post-conflict contexts, and temporal variation in the effects of conflict is one possible reason that Gates and colleagues' (2010) study of yearly conflict and enrolment data did not find significant negative effects (although it did for other development indicators).

Findings

Conflict and Enrolment

Model 1 (Table 1) represents the simplest analysis of the relationship between conflict and enrolment trajectories. The baseline and growth of net enrolment are an outcome of the dichotomous conflict variable. The baseline intercepts (87.13% for primary NER and 65.99% for secondary NER) are the average net enrolment rate for non-conflict countries (i.e. those for which the conflict variable is zero). For conflict-affected countries (those for which the conflict variable has a value of one), the conflict coefficient is added to the intercept in computing the expected baseline; as the coefficients are negative, this results in a decrease of 12.95% for primary NER and 25.47% for secondary NER). Similarly, the average rate of change for non-conflict countries is represented by the growth intercept (0.35% per year for primary NER and 0.70% per year for secondary NER).

Surprisingly, in Model 1 the coefficients for the effect of conflict on growth were positive (0.70% and 0.77% for primary and secondary NER, respectively), meaning that conflict-affected countries are associated with higher growth in enrolments. However, inspection of the empirical growth plots (Figure 1) provides an explanation for this: countries with lower baselines tend to have higher rates of growth in both the conflict and non-conflict groups. The maximum possible NER of one hundred percent creates a ceiling effect as enrolment rates approach the maximum. Additionally, it is possible that diminishing returns to investment in education make growth in enrolment more difficult (and expensive) as the level of enrolment rises (Lewin 2007, 46). As conflict-affected countries have lower baseline values, they also tend to have higher rates of growth.

Table 1

MODELS OF ENROLMENT AND CONFLICT

	Model 1		Model 2		Model 3 ⁺	
	Primary	Secondary	Primary	Secondary	Primary	Secondary
<u>Baseline</u>						
Intercept	87.13**	66.64**	87.16**	66.70**	85.68**	64.01**
Conflict	-12.95**	-25.61**	-13.09**	-25.61**	-1.88**	-4.11**
<u>Growth</u>						
Intercept	0.35**	0.70**	0.61**	1.02**	0.49**	0.83**
Conflict	0.70*	0.77**	-1.08**	-1.88**	-0.15**	-0.31**
Baseline	--	--	-0.14**	-0.10**	-0.14**	-0.10**
<u>Std. Dev.</u>						
Baseline	17.03	25.88	16.99	25.93	17.05	25.73
Growth	1.23	0.83	1.66	2.30	1.64	2.23
Residuals	2.29	2.67	2.29	2.67	2.29	2.67
<u>Fit</u>						
AIC	8797	6849	8806	6856	8815	6865
BIC	8840	6890	8863	6911	8863	6911

* p < 0.05 ** p < 0.01

⁺ Continuous conflict variable

TABLE 1: Results for models of conflict and NER using multilevel modelling

Therefore, a more pertinent question is whether conflict and non-conflict countries with the same baseline would have differing enrolment trajectories. Model 2 investigates this by adding a baseline interaction term to the growth component of the model, thereby controlling for the effect of the baseline on growth. To facilitate interpretation of model parameters, the baseline term is mean-centred at 85.28% and 63.57% for primary and secondary NER respectively. Results from this model show that when we control for the baseline, the effect of conflict on growth is negative. On average, enrolment grows by 0.61% per year for primary NER and 1.02% for secondary NER, however growth in conflict-affected countries is significantly lower. The difference in growth rates is a reduction of 1.08% per year for primary NER and a drop of 1.88% for secondary NER. As expected, the effect of the baseline on growth is negative: as countries' year 2000 baseline enrolment increases, the expected rate of growth decreases slightly.

Model 2 yields several interesting insights into changes in net enrolment rates. First, it shows that conflict-affected countries had lower overall enrolment rates in the year 2000 than non-conflict countries. Since conflict is measured after the baseline value, this means that conflicts occurred in countries with lower enrolments rates. Second, the model shows a negative effect of conflict once we control for differences in countries' baseline values: if one considers two hypothetical countries with identical baselines – one of which was conflict-affected – we would expect growth to be lower for the conflict-affected country. Taken together, these two points describe a complex interaction between countries' initial enrolment

level, conflict, and growth in enrolment. For countries with low levels of initial enrolment, we expect higher rates of growth: in these cases we expect conflict to decrease the rate of growth, although growth may remain positive. This trajectory describes most conflict-affected countries, which had low levels of enrolment in the start of the analysis timeframe. In countries with higher baseline values, we expect lower rates of growth. In these cases, the negative effects of conflict will result in a decline in enrolment in absolute terms. Figure 3 illustrates the relationship between baseline, conflict and primary enrolment trajectories, using hypothetical and observed data.

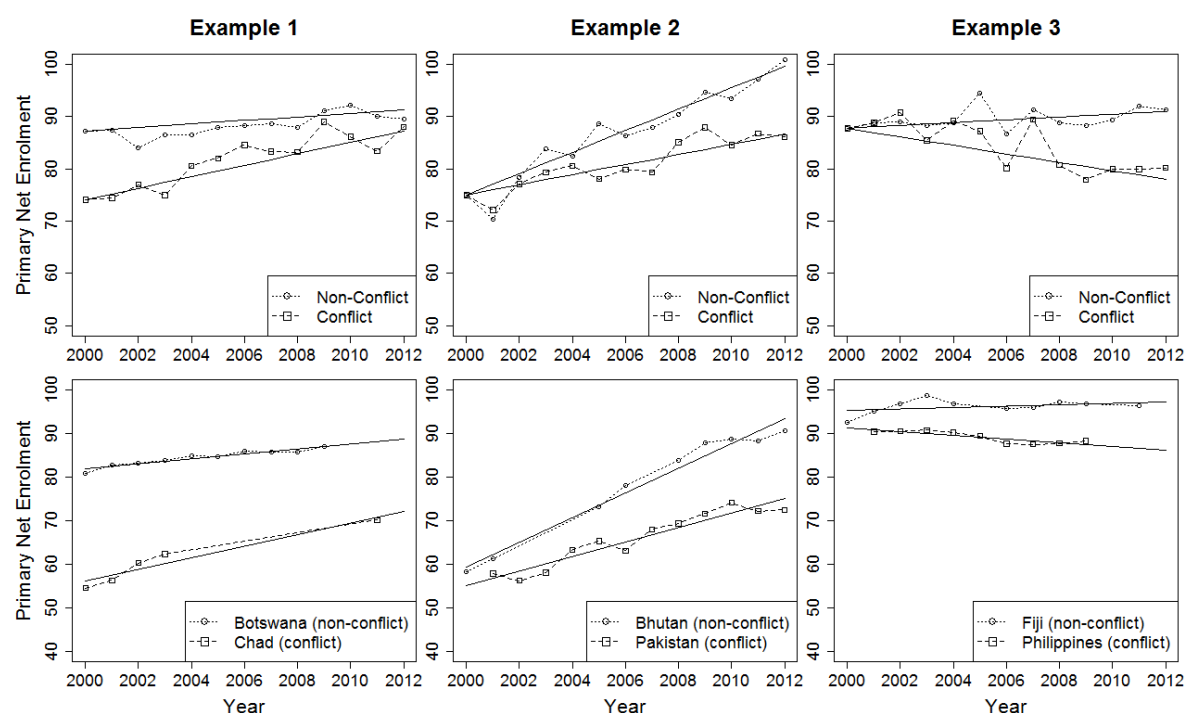


FIGURE 3: Sample trajectories for conflict-affected and non-conflict countries, illustrating the relationship between baseline enrolment values, conflict and growth. The top rows shows hypothetical trajectories based on model parameters: the solid line demonstrates linear trajectories and the dotted/dashed lines indicate plausible enrolment variables based on residual parameters. Example 1 trajectories are based on the average baseline and growth values for non-conflict and conflict-affected countries, respectively. Example 2 shows differences between a non-conflict and conflict affected country with low baselines, and Example 3 illustrates the same relationship for countries with high baselines. The bottom row shows actual enrolment trajectories for exemplar countries that illustrate the relationship.

If the underlying concepts of the model are valid, then higher levels of conflict would be associated with greater effects on enrolment trajectories. Model 3 confirms that this is the case: instead of a dichotomous (conflict/non-conflict) variable, the conflict data used in the model are the average number of BRDs per year, scaled logarithmically. Results show that the effect of conflict is negative in relation to baseline and growth.

Thus, models of enrolment trajectory and conflict show a clear relationship between these variables. In all models, the effect of conflict on baseline values and growth is statistically significant, and once the baseline interaction is accounted for the models show a consistently negative effect of conflict on growth in primary and secondary NER. However, because of

the interaction between baseline and growth – particularly the tendency for conflict affected countries to have lower baselines – this negative effect is more often manifested as a decrease in growth rather than a decline in absolute terms. Nevertheless, given the results of the models, we would expect that overall growth in enrolment would be lower in conflict-affected countries than in non-conflict countries if baseline enrolments are equal, and that more intense conflict (measured in battle-related deaths) is associated with larger decreases in enrolment growth.

The standard deviations of model parameters – measures of the extent to which they vary in their intercepts and growth rates – are relatively consistent across models. Of particular interest are the standard deviations of growth parameters, which give an indication of how much a typical country might differ in its actual growth rate from that predicted by the model. For all models, the variation in growth rates is comparable to the effect of conflict (i.e. 0.83% to 2.29% per year); thus models show that although we can generalise broad trends across countries there is substantial variation in growth rates that is due the particular national context. This highlights the continuing need for country-specific research on conflict and education that is grounded in an understanding of local contexts.

Fragility, Conflict and Enrolment

Models 4 and 5 (Table 2) extend previous models by including a term for fragility, making it possible to examine the effects of conflict and fragility independently. In Model 4, both conflict and fragility are treated as dichotomous variables. Results are striking: when fragility is added to the model the effect of conflict is no longer significant; we cannot confidently establish that the effect of the conflict variable is different from zero. However, the fragility variable is significantly related to both the baseline value and growth of primary and secondary enrolment, suggesting that changes in enrolment are better explained by fragility than conflict. If we consider two hypothetical countries – of which one is fragile and the other is not – we would expect to see a large difference in enrolment trajectories, whether or not the countries experienced a conflict. Similarly, if we consider two hypothetical fragile countries, only one of which was conflict affected, we would not expect to see any substantial difference in their enrolment trajectories.

Table 2

MODELS OF ENROLMENT BASED ON FRAGILITY AND CONFLICT

	Model 4		Model 5 ⁺	
	Primary	Secondary	Primary	Secondary
<u>Baseline</u>				
Intercept	93.61**	78.93**	103.45**	93.95**
Conflict	-0.86	-4.50	0.95	0.82
Fragility	-20.43**	-40.91**	-2.29**	-4.15**
<u>Growth</u>				
Intercept	1.52**	-0.42*	2.62**	-2.65**
Conflict	-0.02	0.69	0.12	-0.02
Baseline	-0.17**	0.06**	-0.17**	0.10**
Fragility	-2.56**	2.99**	-0.27**	0.46**
<u>Standard Deviation</u>				
Baseline	15.59	19.96	13.63	16.28
Growth	2.04	1.60	1.74	2.18
Residuals	2.31	2.43	2.31	2.42
<u>Fit</u>				
AIC	7470	5379	7452	5351
BIC	7527	5433	7510	5405

* p < 0.05 ** p < 0.01

⁺ Continuous conflict and fragility variables

TABLE 2: Results of models of fragility, conflict and education using multilevel modelling.

Interpreting the parameters of primary enrolment models is relatively straightforward: fragile countries have lower baselines and lower growth rates. As with previous models, lower baselines tend to have significantly higher rates of growth. Thus, for many fragile countries, the effect of fragility is manifested as a decrease in their rate of growth; for others (those with higher baselines), it is a decline in absolute terms. The effect of the dichotomous fragility variable on both baseline and growth is larger than that of the dichotomous conflict variable in Model 2.

For secondary NER, interpretation is more challenging. The effect of fragility on the baseline was massive; on average, fragile countries' year 2000 values were 40.91% lower than non-fragile countries. However, patterns of growth differ substantially from those in previous models. The growth rate for non-fragile countries (i.e. the growth intercept) is slightly negative, but it increases with higher baselines; unlike all previous models, the coefficient for the baseline term is positive. For non-fragile countries (which have higher than average baselines), this will result in predicted positive growth. Fragile countries have a much lower baseline on average, and the baseline interaction term lowers the expected growth rate substantially. Thus, although the coefficient of fragility is positive, the lower baselines of fragile countries will result in decreased growth. Conceptually unravelling the relationship between baseline values, fragility and growth is challenging. Additionally, the high degree of

covariance between fragility and baselines may introduce issues of multicollinearity into the analysis: as fragile countries have substantially lower baselines it is not possible to completely disaggregate the effects of the variables; some of the effect of fragility may be captured in the baseline parameter.

For both primary and secondary NER, the results of Model 5, which uses continuous variables for fragility and conflict, match Model 4 in the signs and significance of parameters. As with Model 3, this establishes that higher levels of fragility are associated with greater changes in enrolment trajectories. This corroboration lends conceptual validity to fragility as a determinant of enrolment changes.

Discussion

The results of our analysis provide clear and consistent evidence that conflict is associated with lower rates of growth in primary and secondary NER, so our analysis supports the assumption that conflict will be damaging to enrolment rates. In many cases, the effect is a decrease in the rate of growth, although there is also evidence of some decline in absolute terms. This relationship is consistent across primary and secondary enrolment rates and for both continuous and dichotomous measures of conflict. However, when we control for state fragility, the relationship between conflict and education is not statistically significant. This is consistent with the notion that fragility is an underlying cause of both conflict and decreased educational outcomes and suggests that those concerned with educational access in difficult circumstance widen their analysis beyond violent conflict.

However, it is important to emphasise that the models test hypotheses about the relationship between conflict, fragility and changes in net enrolment, but they do not purport to fully model changes in net enrolment. Thus, while variables such as gross domestic product, geographic region and population growth might improve the model fit, they would not shed light on the relationship between conflict, fragility and education and are therefore beyond the scope of our analysis. Our study is also limited in its measurement of outcomes: We selected NER as our outcome variable due to the wide coverage and comparability of data and its relevance to global policy initiatives (i.e. EFA and MDG 2). However enrolment rates do not reflect the quality of education, student achievement, etc. In addition, we rely on national-level data and use the nation-state as our unit of analysis; in relation to conflict, this ‘methodological nationalism’ (Wimmer and Schiller 2002) tends to underestimate the effects of conflict, which are often localized and regional. Finally, missing data is another difficulty inherent to any cross-national study of conflict and education: if it is true that conflict is associated with diminished state capacity, then it is reasonable to suspect that this includes the state’s ability to measure and report enrolment. Thus, it is quite possible that the countries with the most affected enrolments are also those for which data are missing and are therefore absent from our analysis. Research on missing data has shown that governance factors (e.g. political stability) are a significant predictor of missing data for educational indicators (Salinas 2013); therefore systematic analysis of conflict, and incidences of missing data is a fruitful area for future research.

Notwithstanding these limitations, our analysis has important implications for debate around the effects of conflict on educational outcomes. The picture is more nuanced than that portrayed in either the 2011 *Global Monitoring Report* or the 2012 *Human Security Report*. On one hand, results of our analysis clearly show that conflict is associated with lower enrolment; whether through decreased rates of growth or an absolute decline. Although the *Human Security Report* is correct in its observation that education ‘appears to *improve* during many periods of warfare’ (2012, 79), it is also true that the *rate of improvement* declines significantly. Its claim that ‘the average effect of conflict on educational outcomes is...a minor decrease in the rate at which they improve’ (ibid. 2012, 103) is more accurate. However, categorizing a 1-2.5% decrease in enrolment growth per year as ‘minor’ is questionable, as this would amount to a substantial number of out-of-school children when compounded annually for all conflict-affected countries. This decrease in the rate of improvement can reasonably be understood as a damaging effect of conflict on education, substantiating the core EiE assumption. That said, the 2011 *Global Monitoring Report* could be more accurate in characterising the relationship between conflict and education. While it is true that ‘conflict-affected countries are heavily concentrated at the wrong end of the global scale measuring education performance’ (UNESCO 2011, 131), this implies an unsubstantiated causal link between conflict and low levels of enrolment. Using this approach, it would be equally possible (and equally problematic) to point out that conflict-affected countries have higher-than-average growth in enrolment rates. A more accurate synopsis would be that conflict occurs more often in countries with low levels of enrolment, and that enrolment growth in these countries is lower than one would expect in a non-conflict country. The *Global Monitoring Report* lamentation that ‘conflict is destroying opportunities for education on a global scale’ (UNESCO 2011, 132) is somewhat hyperbolic, although the effects of conflict are important.

Perhaps the most fruitful aspect of the debate over the ‘mainstream narrative’ is the *Human Security Report*’s (2012, 109) suggestion that state fragility – rather than conflict – is a ‘root cause’ of low educational outcomes. While our methods would not be sufficient to establish causality, our results are certainly consistent with the hypothesis that conflict and reduced growth in enrolment are just two of many possible elements of state fragility. This suggests that a key area for future research is developing a better understanding of the relationship between fragility and enrolment rates, and that fragility may explain both poor growth in enrolments and the outbreak of conflict. In particular, widely acknowledged features of fragility (e.g. low capacity, limited political will and poor governance [OECD DAC 2007]) merit attention in terms of their potential impact on education. Finally, the concept of state fragility may be better able to address the changing nature of violence than the conventional understanding of conflict that prevails in the ‘mainstream narrative’. The *World Development Report 2011* (World Bank 2011, 53) argues that ‘the tendency to see violence as interstate warfare and major civil war obscures the variety and prevalence of organized violence – and underestimates its impact on people’s lives’. As discussed above, ‘conventional’ conflict has been decreasing since the early 1990s, while other forms of violence are affecting large numbers of people in countries often not considered to be conflict-affected but which may fall under definitions of fragility.

However, it is important to acknowledge that at present the concept of fragility offers only an illusion of ‘a unique and solvable problem’ because there ‘is no consensus on what that problem is or on what the terms ‘fragility’ and ‘fragile states’ encompass and exclude’ (Bengtsson 2011, 34). While the problems associated with fragile states appear to merit a remedy of state capacity building and the promotion of ‘political will’, systemic aspects of the global context potentially limit the fruitfulness of this approach. In a very real sense, fragile and non-fragile states can be considered two sides of the same coin, as some features of fragile states (e.g. a high reliance on primary commodities rather than manufactured goods) are requisite to the current functioning of non-fragile states. The normative underpinnings of fragility – specifically the use of democratic, free-market nation-states as a universal model – appear to reproduce some shortcomings of the liberal view of conflict and in some cases can be a barrier to peace (Horner 2012). From a practical angle, while the term ‘fragility’ has become common parlance, it remains to be seen whether the various definitions and classifications of fragility developed in different organisations share conceptual validity. Based on our findings, developing a stronger and more rigorous understanding of the complex relationship between state fragility, conflict, and education is essential to improving policy and practice.

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